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EXAMINER	
ENGLUND, TERRY LEE	
ART UNIT	**PAPER NUMBER**
2816	

DATE MAILED: 08/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/772,312	BLODGETT, GREG A.	
	Examiner	Art Unit	
	Terry L Englund	2816	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *17,18 and 24-43* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *29-32,34,39 and 43* is/are allowed.

6)☒ Claim(s) *17,18,24-28,33,35-38 and 40-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 February 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *02062004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

The drawings are objected to because combinational logic 440 of Fig. 6 is not shown receiving signal "C0_" as the second paragraph of page 12 implies. Therefore, either the description, or a signal label within Fig. 6's 440, is incorrect. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are also objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: Although the output of Figs. 4A and 4B is shown identified as "VP2", wherein sign "242" is not shown (as the last line of page 10, and on line 14 of page 12, both indicate). Corrected drawing sheets in

compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities: The section added to page 1, identifying related application 10/078,418, should be updated to indicate it was issued as U.S. Patent 6,717,459 on Apr 6, 2004. Page 10, line 20 "240" is believed to mean --290--, or else "290" in Fig. 4A-2 should be --240--. If either change is made, the description will then correspond to the labeling within the figure. Appropriate corrections are required.

Claim Objections

Claims 24, 27-39, and 43 are objected to because of the following informalities: Claim 24, line 4 "a ancillary" should be --an ancillary-- to improve word flow. Claim 27, line 2 should have --to-- added after "respect" to improve word flow, and line 3 should have "charge pumps" changed to --single phase charge pump circuits-- to clearly relate the currently recited "plurality of charge pumps" with the two different sets (single phase and ancillary) of charge pump circuits recited within claim 24. This change will also ensure consistent labeling throughout the claims (e.g. "charge pump circuits" versus "charge pumps"). Line 2 of both claims 28 and 38 should

have "comprise" changed to --comprises-- to correspond to the singular "said plurality." Claim 29, line 5 "singe" should be --single-- to correct a typo, and line 7 "a" should be --an-- to improve word flow. Claim 32, line 1 "circuit p" should be --circuit-- to correct a typo, and line 2 should have --to-- added after "respect" to improve word flow. Claim 34, line 5 "singe" should be --single-- to correct a typo, and line 7 "a" should be --an-- to improve word flow. Claim 39, line 6 should have a comma added after "circuit" and "flip-flop" to minimize possible confusion. Otherwise, it would appear the "flip-flop" itself transfers the energy, instead of the circuit with the flip-flop. Similar to claim 39 above, line 8 of claim 43 should have a comma added after "circuit" and "flip-flop" to minimize possible confusion with respect to what actually transfers the energy. Appropriate corrections are required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 17-18, 33, and 40-42 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. Claim 17, line 2 "four phase circuits" is vague and indefinite because it can be interpreted numerous ways. For example, it can mean: 1) four separate phase circuits, wherein each phase circuits can operate with its own respective phase (e.g. single, dual, or quad); or 2) two or more separate phase circuits, wherein each individual phase circuit operates from four phases (e.g. four clock signals). It is not clear how the first-fourth single phase charge pump circuits of claim 33 relate to the "four single phase charge pump circuits" recited within claim 32. For example, can the first-fourth single phase charge pump

circuits be in addition to the circuits already recited within claim 32? If they are meant to refer to the same circuits, it is suggested "plurality of" on line 1 of claim 33 be changed to --said four-- to minimize possible confusion. Claim 40, line 2 has the same "four phase circuits" problem as claim 17 described above. Claim 42, lines 5-15 are confusing with respect to "a plurality of single phase charge pump circuits" (lines 5, 7, 10-11, 11-12), "at least four_single phase charge pump circuits" (line 6), "said at least two single phase charge pump circuits" (lines 9-10), and the first-fourth single phase charge pump circuits (lines 12-15). For example, the "plurality" on line 5 implies there could be only two or three circuits. Therefore, how can there be four circuits as line 6 implies? Was line 5's "a plurality of" meant to mean --a plurality of at least four--? How do the "said at least two" on lines 9-10 relate to the "at least four" already recited on line 6? For example, are they part of the four, or are they additional circuits? Similarly, how do the first-fourth circuits relate to the "at least four" and "said at least two"? As presently written, it appears possible that claim 42 could have at least 10 single phase charge pump circuits (e.g. "at least four" + "at least two" + the first-fourth). Therefore, corrections and/or clarifications are required to clearly indicate what the applicant's single phase charge pump circuit limitations, recited within claim 42, are possibly intended to mean.

Related to the "four phase circuits" problem of claims 17 and 40 described above, claims 17-18 and 40-41 are also rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are how the "four phase circuits" actually relate to one another. For example, are the circuits coupled in series or parallel with one another, or do they

have separate inputs and outputs, can they be collectively included in an overall circuit that is called a charge pump circuit?

Each of claims 35-38 recites the limitation "The memory device of claim" 29 or 32 in line 1 with insufficient antecedent basis for this limitation in the claim. Were these claims meant to depend on claim 34, either directly or indirectly?

Claim 42 recites the limitation "said multi-phase charge pump circuit" in lines 3-4. There is insufficient antecedent basis for this limitation in the claim. If it is referring to "a charge pump circuit" recited on line 3, consistent labeling would minimize possible confusion.

Dependent claims carry over any rejection(s) from any claim(s) upon which they depend.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 24-28, and 42-43 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 8-11, respectively, of U.S. Patent No. 6,717,459. Although the conflicting claims are not identical, they are not patentably distinct from each other because: 1) One of ordinary skill in the art would understand that the two single phase charge pump circuits, the plurality of ancillary charge pump circuits with

ancillary capacitors, and the charge transfer circuit of the patent's claim 8 correspond to the present application's plurality of single phase charge pump circuits, plurality of ancillary charge pump circuits with ancillary capacitors, and plurality of charge transfer circuits as recited within claim 24, wherein it is understood that if there is more than just two single phase charge pump circuits, there would be more than just the one charge transfer circuit as recited within the patent. 2) The operation of the first/second single phase charge pump circuits being 180° out of phase recited within the patent's claim 9 corresponds to the present application's claim 25 which recites at least two of the circuits are operated in offset phase from another. 3) Other than the preamble of the patent's claim 10, the rest of the claim corresponds directly to the limitations recited on lines 5-15 of the present application's claim 42. Although claim 42 also includes a memory device with a memory circuit coupled to the charge pump circuit, the patent does disclose that elevated voltages are used with DRAMs and EEPROMs (e.g. see column 1, lines 14-16), known types of memory devices/circuit. Therefore, one of ordinary skill in the art would know that the claimed charge pump circuit could be used with a memory device/circuit. 4) Similarly, the body of claim 11 of the patent directly corresponds to lines 5-12 of the present application's claim 43. As with claim 42, claim 43 also includes a memory device with a memory circuit coupled to a charge pump output. Also, it would be obvious to one of ordinary skill in the art that the patent's claims could have also included limitations indicating at least two ancillary charge pump circuits would be operated in offset phase from another (as recited within the present application's claim 26), and the plurality of single phase charge pump circuit could have four of them operated 90° out of phase with respect to one another (as recited within the present application's claims 27 and/or 28).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

In so far as being understood, claims 17-18, and 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chern, in view of Kleveland and the knowledge of one of ordinary skill in the art. Fig. 4 of Chern shows a four phase (charge pump) circuit comprising a primary (charge pump) phase circuit Q1-Q6,C1-C4 (e.g. see Fig. 2, and column 3, lines 10-12), and a respective ancillary phase circuit Q7-Q10 (e.g. see Fig. 4, and column 5, lines 37-40). Transistors Q7,Q8 of the ancillary phase circuit serves to control transistors Q5,Q6 of the primary (charge pump) phase circuit (e.g. see column 6, lines 11-12). However, the reference does not show or disclose a charge pump circuit comprising four of such phase circuits. One of ordinary skill in the art knows that a plurality of parallel connected charge pumps can be used to reduce ripple of the boosted output voltage, and also provide a means for increasing the amount of output current if that is a requirement. Fig. 2 of Kleveland shows four separate four-phase circuits 13-13c, and discloses the use of multiple, parallel charge pumps reduce ripple and noise, as well as improving efficiency of the circuit (e.g. see column 4, lines 40-48). Therefore, it would have been obvious to one of ordinary skill in the art to apply Kleveland's teachings, and the knowledge of one of ordinary skill in the art, to couple four of Chern's Fig. 4 four-phase circuits in parallel, and operate them at phases different from one another to minimize noise, thus rendering claim 17 obvious. Four of Chern's circuits would provide a means to reduce the

output ripple with respect to boosted voltage VCCP, as well as provide more current (e.g. 4x the amount with respect to using only one individual charge pump) to the output for circuitry that requires a stable output voltage, and high current. If a further reduction in ripple, and/or an increase in output current, are desired, additional phase circuits could be added in parallel. Since each phase circuit would operate at different phases, each respective ancillary phase circuit would also operate out of phase with one another, and claim 18 is rendered obvious. Neither the Chern, nor the Kleveland, reference discloses the use of the charge pump circuit with a memory device. However, it would have been obvious to one of ordinary skill in the art to use the four parallel connected four-phase circuits of Chern in a memory device, rendering claims 40-41 obvious for the same reasons as applied above with respect to claims 17-18. Memory circuits typically require boosted voltages to perform their operations (e.g. writing and/or reading), and charge pump circuits are a known means for providing that boosted voltage.

Claims 1-16, and 19-23 have been cancelled.

Allowable Subject Matter

Claims 29-32, 34, 39, and 43 are allowed. There is presently no motivation to modify or combine any prior art reference(s) to ensure the charge pump comprises: 1) the plurality of single phase charge pump circuits, each with a bootstrap capacitor; the plurality of ancillary charge pump circuits, each with an ancillary capacitor; and the plurality of charge transfer circuits as recited within claims 29 (upon which claims 30-32 depend) and 34; and 2) the first charge pump phase circuit with its first bootstrap capacitor; the second charge pump phase circuit with its second bootstrap capacitor; and the circuit, including a flip-flop, as recited within each of claims 39 and 43, wherein the circuit transfers energy from the first bootstrap capacitor to the second

bootstrap capacitor when the flip-flop is toggled. However, it is suggested the objections to some of the claims, as previously described above, be addressed/corrected.

It is believed claim 42 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action. There is presently no strong motivation to modify or combine any prior art reference(s) to ensure a charge pump circuit comprises a plurality of at least four single phase charge pump circuits, wherein these four are operated 90° out of phase with one another, and the charge pump circuit also includes a charge transfer circuit for transferring charge between at least two of those four single phase charge pump circuits that the limitations of claim 42 probably intended to mean.

Also, claims 33, and 35-38 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims. Claim 33 depends on allowed claim 32, and it is believed claims 35-38 are intended to depend on allowed claim 34.

Prior Art

The other prior art references cited on the accompanying PTO-892 are deemed relevant to at least sections of the claimed limitations. Maeda's Fig. 5 shows four single-phase charge pumps 4a-4d coupled in parallel, and operated 90° out of phase with respect to one another (e.g. see the waveforms in Fig. 6 corresponding to the timing of signals D_0-D_3). The reference also shows/discloses the charge pumps are associated with a memory device (e.g. see Figs. 1 and 10). Bajwa shows a plurality of eight two-phase charge pumps 300-Q – 300-H coupled in parallel in Fig. 1, and discloses that the parallel units increase the output current; the number of units can be changed to meet the desired requirements, and they operate at different times (i.e. out of phase)

to minimize noise. Fig. 4 of Bajwa shows a charge pump circuit which includes three different flip-flop circuits (253/254, 255/256, and 264/265). Fujita's Fig. 10 shows and discloses another example of coupling a plurality (e.g. four) of four-phase charge pump circuits 20_1-20_n in parallel, wherein Fig. 11 shows an example of one of the four-phase charge pump circuits. However, none of these references clearly shows or discloses what could be considered an ancillary phase circuit with an ancillary capacitor, or a circuit, with a flip-flop, for transferring charge as recited within some of the claims described above.

The prior art references cited on the IDS submitted Feb 6, 2004 were reviewed and considered. None of them shows or discloses a charge pump circuit as recited within the claims. The AC (Takeshima et al.), AF (Takano et al.), and AK (Akita et al.) references are of the most interest. Although each one shows/discloses some type of means for transferring charge between capacitors within a plurality of charge pump circuits, none of these reference clearly shows or discloses what could be considered an ancillary phase circuit (with an ancillary capacitor) for controlling a transistor within a primary phase circuit, or a circuit, with a flip-flop, for transferring charge as recited within some of the claims described above.

Any inquiry concerning this communication from the examiner should be directed to Terry L. Englund whose telephone number is (571) 272-1743. The examiner can normally be reached Monday-Friday from 7 AM to 3 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Callahan, can be reached on (571) 272-1740.

The new central official fax number is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (571) 272-1562.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TLE
Terry L. Englund

6 Aug 2004

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